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(21) International Application Number: PCT/US97/08960 (22) International Filing Date: 23 May 1997 (23.05.97) (30) Priority Data: 96109178.2 7 June 1996 (07.06.96) EP <i>(34) Countries for which the regional or international application was filed:</i> DE et al. (71) Applicant (for all designated States except US): THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): GUARRACINO, Mario [IT/IT]; Via da Denominare, 28, 9, I-64028 Silvi Marina (IT). GAGLIARDINI, Alessandro [IT/IT]; Via Castellino, 14, I-60035 Jesi (IT). (74) Agents: REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: ABSORBENT ARTICLE COMPRISING A POLYFUNCTIONALLY SUBSTITUTED AROMATIC CHELATING AGENT FOR ODOUR CONTROL (57) Abstract The present invention relates to absorbent articles in particular sanitary napkins and panty liner having an odour control system comprising a polyfunctionally substituted aromatic chelating agent for improved odour control.		

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ABSORBENT ARTICLE COMPRISING A POLYFUNCTIONALLY SUBSTITUTED AROMATIC CHELATING AGENT FOR ODOUR CONTROL

Field of the Invention

The present invention relates to absorbent articles in particular sanitary napkins and panty liners comprising which provide improved odour control benefits.

Background of the Invention

Whilst the primary focus of absorbent articles remains the ability of these articles to absorb and retain fluids, another important area of development in this field is the control of odorous compounds contained within the absorbed fluids or their degradation products. There are a wide range of compounds which may be present in an absorbent article during use which result in the formation of malodours. These compounds include fatty acids, ammonia, amines, sulphur containing compounds and ketones and aldehydes.

The art is replete with descriptions of various odour controlling agents for use in absorbent articles in order to address the problem of malodour formation. These agents can typically be classified according to the type of odour the agent is intended to combat. Odours may be classified as being acidic, basic or neutral. Acidic odour controlling agents have a pH greater than 7 and typically include inorganic carbonates, bicarbonates, phosphates and sulphates. Basic odour controlling agents have a pH of less than 7 and include compounds such as citric acid, boric acid and maleic acid.

Neutral odour controlling agents have a pH of approximately 7. Examples of these types of compounds include activated carbons, clays, zeolites, silicas and starches, for example as described in EPO 348 978, EPO 510 619, WO 91/12029, WO 91/11977 and WO 91/12030 .

All of these types of odour control agents are believed to control odour by a mechanism whereby the malodorous compounds and their precursors are absorbed by the agent. However, such mechanisms are not completely effective

as the formation of the odour itself is not prevented and thus odour detection is not completely eliminated.

US 4 356 190 discloses the use of aminopolycarboxylic compounds and aminophosphonates for inhibiting the production of undesirable products on body surfaces and their use in catamenial products.

EPO 524 581 discloses the removal of odours by the formation of an insoluble complex with the odour causing cations. Suitable compounds include fluorides, phosphates and oxalates. The compositions find application in catamenials, diapers and incontinence products.

However, there still exists a need to provide an odour controlling agent or system which provides effective odour control over a wide range of malodorous compounds. In particular, there exists a need to provide a system which hinders and preferably prevents the formation of odorous compounds themselves and which absorbs any residual odour.

It has now been surprisingly found that the above needs can be addressed by the use of a an odour control system comprising a polyfunctionally substituted aromatic chelating agent.

Summary of the Invention

The present invention relates to an disposable absorbent article comprising a liquid pervious topsheet, an absorbent core and a backsheet. The core is intermediate said topsheet. The absorbent article comprises an odour control system comprising a polyfunctionally substituted aromatic chelating agent.

Detailed Description of the Invention

According to the present invention the absorbent articles thus comprise as an essential component an odour control system comprising a polyfunctionally substituted aromatic chelating agent. Polyfunctionally-substituted aromatic chelating agents useful herein are disclosed in U.S. Patent 3,812,044, issued

May 21, 1974, to Connor et al included herein by reference. Of the agents disclosed therein it has been found that optimum chelating agent action is achieved with those in which the functional groups are positioned near each other, more preferably where the functional groups are attached to adjacent carbon atoms on the aromatic nucleus. Preferred compounds of this type in acid form are dihydroxydisulfobenzenes such as 1,2-dihydroxy-3,5-disulfobenzene.

The absorbent article of the present invention preferably comprise from 5gm^{-2} to 300gm^{-2} , more preferably from 10gm^{-2} to 180gm^{-2} , most preferably from 35gm^{-2} to 65gm^{-2} of said odour control system.

In addition to the polyfunctionally substituted aromatic chelating agents the odour control system may comprise additional chelating agents known in the art such as aminocarboxylates and aminophosphonates. Furthermore the system may comprise additional odour control agents such as zeolites, silica, activated carbon, absorbent gelling material, antimicrobials or mixtures thereof, all of which are known to the those skilled in the art. Preferably the polyfunctionally substituted aromatic chelating agents are present in combination with an additional odour control agent at a ratio by weight of from 1:5 to 5:1, preferably from 1:3 to 3:1.

According to the present invention the weight of the odour control system which may be used in the absorbent article can be readily determined by the skilled person bearing in mind the absorbent article dimensions. For example the absorbent article may comprise from 0.5g to 5g, preferably from 1g to 3g, most preferably from 1.5g to 2.5g of said odour control system.

The chelating agent and any optional odour control agents may be incorporated into the absorbent article by any of the methods disclosed in the art, for example layered on the core of the absorbent article or mixed within the fibres of the absorbent core. The chelating agent is preferably incorporated between two layers of cellulose tissue. Optionally the system may be bonded between two cellulose tissue layers with, for example, a hot melt adhesive or any suitable bonding system.

More preferably the chelating agent are incorporated in a layered structure in accordance with the disclosure of WO 94/01069 or Italian patent application number TO 93A 001028. TO 93A 001028 describes a layered structure substantially as described in WO 94/01069 with the exception that TO 93A 001028 comprises a much higher quantity of absorbent gelling material in the intermediate layer which is between the fibrous layers (120gm^{-2}) that would be incorporated as an optional component in the present invention. The intermediate layer comprises in particular a polyethylene powder as thermoplastic material which is mixed with the premixed odour control agent and chelating agent of the present invention. The mixture is then heated such that the polyethylene melts and glues the laminate layers and components together. The bridges which form the bond points between the fibrous layers involve particles of AGM as well as particles of thermoplastic material. (The absorbent capacity of the AGM is unaffected by bonding.) The adhesive lines are preferably also placed on the edges of the laminate to ensure that the edges of the laminate stick and any loose odour control material or chelating agent does not fall out of the laminate.

The chelating agent may be incorporated as a powder or a granulate within the absorbent article. The chelating agent may be distributed homogeneously over the entire absorbent article, in the secondary topsheet, in at least one layer of the core. In a preferred embodiment said chelating agent is positioned such that at least a portion of the fluid discharge comes into contact with said chelating agent before said odour control agent. In particular, said chelating agent is located in a separate layer from the odour control agent. More preferably the chelating agent is located towards the topsheet or is located in the topsheet itself and the odour control agent is located further away from the topsheet than the chelating agent. Most preferably the chelating agent is positioned in at least one of the topsheet layers and the odour control material is positioned in the core. In particular, the chelating agent is located at the fluid discharge entry point of the absorbent article.

The chelating agent and optional odor control agent may be distributed homogeneously throughout the absorbent article or any one of the layers thereof, or may be distributed substantially in the centre of the absorbent article or substantially on the edges of the absorbent article.

Absorbent core

According to the present invention, the absorbent core can include the following components: (a) an optional primary fluid distribution layer preferably together with a secondary optional fluid distribution layer; (b) a fluid storage layer; (c) an optional fibrous ("dusting") layer underlying the storage layer; and (d) other optional components. According to the present invention the absorbent core may have any thickness depending on the end use envisioned.

a Primary/Secondary Fluid Distribution Layer

One optional component of the absorbent core according to the present invention is a primary fluid distribution layer and a secondary fluid distribution layer. The primary distribution layer typically underlies the topsheet and is in fluid communication therewith. The topsheet transfers the acquired fluid to this primary distribution layer for ultimate distribution to the storage layer. This transfer of fluid through the primary distribution layer occurs not only in the thickness, but also along the length and width directions of the absorbent product. The also optional but preferred secondary distribution layer typically underlies the primary distribution layer and is in fluid communication therewith. The purpose of this secondary distribution layer is to readily acquire fluid from the primary distribution layer and transfer it rapidly to the underlying storage layer. This helps the fluid capacity of the underlying storage layer to be fully utilised. The fluid distribution layers can be comprised of any material typical for such distribution layers. In particular fibrous layers maintain the capillaries between fibers even when wet are useful as distribution layers.

b Fluid Storage Layer

Positioned in fluid communication with, and typically underlying the primary or secondary distribution layers, is a fluid storage layer. The fluid storage layer can comprise any usual absorbent material or combinations thereof. It preferably comprises absorbent gelling materials in combination with suitable carriers.

Suitable carriers include materials which are conventionally utilised in absorbent structures such as natural, modified or synthetic fibers, particularly modified or non-modified cellulose fibers, in the form of fluff and/or tissues. Suitable carriers can be used together with the absorbent gelling material, however, they can also be used alone or in combinations. Most preferred are tissue or tissue laminates in the context of sanitary napkins and panty liners.

An embodiment of the absorbent structure made according to the present invention may comprise multiple layers comprises a double layer tissue laminate formed by folding the tissue onto itself. These layers can be joined to each other for example by adhesive or by mechanical interlocking or by hydrogen bridge bands. Absorbent gelling material or other optional material can be comprised between the layers.

Modified cellulose fibers such as the stiffened cellulose fibers can also be used. Synthetic fibers can also be used and include those made of cellulose acetate, polyvinyl fluoride, polyvinylidene chloride, acrylics (such as Orlon), polyvinyl acetate, non-soluble polyvinyl alcohol, polyethylene, polypropylene, polyamides (such as nylon), polyesters, bicomponent fibers, tricomponent fibers, mixtures thereof and the like. Preferably, the fiber surfaces are hydrophilic or are treated to be hydrophilic. The storage layer can also include filler materials, such as Perlite, diatomaceous earth, Vermiculite, etc., to improve liquid retention.

If the absorbent gelling material is dispersed non-homogeneously in a carrier, the storage layer can nevertheless be locally homogenous, i.e. have a distribution gradient in one or several directions within the dimensions of the storage layer. Non-homogeneous distribution can also refer to laminates of carriers enclosing absorbent gelling materials partially or fully.

c Optional Fibrous ("Dusting") Layer

An optional component for inclusion in the absorbent core according to the present invention is a fibrous layer adjacent to, and typically underlying the storage layer. This underlying fibrous layer is typically referred to as a "dusting" layer since it provides a substrate on which to deposit absorbent gelling material in the storage layer during manufacture of the absorbent core. Indeed, in those

instances where the absorbent gelling material is in the form of macro structures such as fibers, sheets or strips, this fibrous "dusting" layer need not be included. However, this "dusting" layer provides some additional fluid-handling capabilities such as rapid wicking of fluid along the length of the pad.

d Other Optional Components of the absorbent structure

The absorbent core according to the present invention can include other optional components normally present in absorbent webs. For example, a reinforcing scrim can be positioned within the respective layers, or between the respective layers, of the absorbent core. Such reinforcing scrims should be of such configuration as to not form interfacial barriers to fluid transfer. Given the structural integrity that usually occurs as a result of thermal bonding, reinforcing scrims are usually not required for thermally bonded absorbent structures.

The topsheet

According to the present invention the absorbent article comprises as an essential component a topsheet. The topsheet may comprise a single layer or a multiplicity of layers. In a preferred embodiment the topsheet comprises a first layer which provides the user facing surface of the topsheet and a second layer between the first layer and the absorbent structure/core.

The topsheet as a whole and hence each layer individually needs to be compliant, soft feeling, and non-irritating to the wearer's skin. It also can have elastic characteristics allowing it to be stretched in one or two directions. According to the present invention the topsheet may be formed from any of the materials available for this purpose and known in the art, such as woven and non woven fabrics and films. In a preferred embodiment of the present invention at least one of the layers, preferably the upper layer, of the topsheet comprises a hydrophobic, liquid permeable apertured polymeric film. Preferably, the upper layer is provided by a film material having apertures which are provided to facilitate liquid transport from the wearer facing surface towards the absorbent structure. If present the lower layer preferably comprises a non woven layer, an apertured formed film or an airlaid tissue.

Backsheet

The backsheet primarily prevents the extrudes absorbed and contained in the absorbent structure from wetting articles that contact the absorbent product such as underpants, pants, pyjamas and undergarments. The backsheet is preferably impervious to liquids (e.g. menses and/or urine) and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials can also be used. As used herein, the term "flexible" refers to materials that are compliant and will readily conform to the general shape and contours of the human body. The backsheet also can have elastic characteristics allowing it to stretch in one or two directions.

The backsheet typically extends across the whole of the absorbent structure and can extend into and form part of or all of the preferred sideflaps, side wrapping elements or wings.

The backsheet can comprise a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material. Preferably, the backsheet is a polyethylene film.

Exemplary polyethylene films are manufactured by Clopay Corporation of Cincinnati, Ohio, under the designation P18-0401 and by Ethyl Corporation, Visqueen Division, of Terre Haute, Indiana, under the designation XP-39385. The backsheet is preferably embossed and/or matt finished to provide a more clothlike appearance. Further, the backsheet can permit vapours to escape from the absorbent structure, i.e. be breathable, while still preventing extrudates from passing through the backsheet. Also breathable backsheets comprising several layers, e.g. film plus non-woven structures, can be used.

According to the present invention the absorbent article may find utility in sanitary napkins, panty liners, adult incontinence products and baby diapers. In particular the present invention finds application in sanitary napkins and panty liners.

WHAT IS CLAIMED IS:

1. An absorbent article comprising a liquid pervious topsheet, a backsheet, and an absorbent core, said core being intermediate said backsheet and said topsheet and said absorbent article comprising an odour control system comprising a polyfunctionally substituted aromatic chelating agent.
2. An absorbent article according to claim 1, wherein said article comprises from 5 gm⁻² to 300gm⁻² of said polyfunctionally substituted aromatic chelating agent.
3. An absorbent article according to one of the preceding claims, wherein said aromatic chelating agent is selected from those wherein the polyfunctional groups are positioned near to one another.
4. An absorbent article according to any one of the preceding claims, wherein said odour control system further comprises an odour control agent selected from zeolite, silica, activated carbon, absorbent gelling materials, or mixtures thereof.
5. An absorbent article according to claim 4, wherein the ratio of said aromatic chelating agent to said odour control agent is from 1:5 to 5:1.
6. An absorbent article according to claim 4, wherein said odour control agent is located further from said topsheet than said aromatic chelating agent.
7. An absorbent article according to any one of the preceding claims, wherein said article is a sanitary napkin or panty liner.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/08960

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61F 13/15

US CL :604/360

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 424/54; 428/905; 604/359-361

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 5,441,727 A (CHATTERJEE et al.) 15 August 1995, Abstract; col. 4, line 64 to col. 5 line 34; col 17 line 64 to col. 18 line 14; and col 18, lines 57-64.	1, 3/1 ----- 2, 3/2
Y	US 3,935,862 A (KRASKIN) 3 February 1976, col. 4, lines 3-12.	2, 3/2

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	* T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/08960

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 4-7
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.